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HIGH-VOLTAGE PULSE GENERATOR,(U)
FEB 80 V S BOSAMYKIN, A I PAVLOVSKIY
UNCLASSIFIED FTD-ID(RS)T-0133-80 NL

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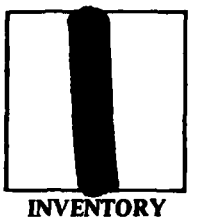

INVENTORY

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FOREIGN TECHNOLOGY DIVISION

HIGH-VOLTAGE PULSE GENERATOR

by

V. S. Bosamykin and A. I. Pavlovskiy

EDITED TRANSLATION

FTD-ID(RS)T-0133-80 1 February 1980

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HIGH-VOLTAGE PULSE GENERATOR

By: V. S. Bosamykin and A. I. Pavlovskiy

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U. S. BOARD ON GEOGRAPHIC NAMES TRANSLITERATION SYSTEM

Block	Italic	Transliteration	Block	Italic	Transliteration
А а	*А а*	A, a	Р р	*Р р*	R, r
Б б	*Б б*	B, b	С с	*С с*	S, s
В в	*В в*	V, v	Т т	*Т т*	T, t
Г г	*Г г*	G, g	У у	*У у*	U, u
Д д	*Д д*	D, d	Ф ф	*Ф ф*	F, f
Е е	*Е е*	Ye, ye; E, e*	Х х	*Х х*	Kh, kh
Ж ж	*Ж ж*	Zh, zh	Ц ц	*Ц ц*	Ts, ts
З з	*З з*	Z, z	Ч ч	*Ч ч*	Ch, ch
И и	*И и*	I, i	Ш ш	*Ш ш*	Sh, sh
Й й	*Й й*	Y, y	Щ щ	*Щ щ*	Shch, shch
К к	*К к*	K, k	Ъ ъ	*Ъ ъ*	"
Л л	*Л л*	L, l	Ы ы	*Ы ы*	Y, y
М м	*М м*	M, m	Ь ь	*Ь ь*	'
Н н	*Н н*	N, n	Э э	*Э э*	E, e
О о	*О о*	O, o	Ю ю	*Ю ю*	Yu, yu
П п	*П п*	P, p	Я я	*Я я*	Ya, ya

*ye initially, after vowels, and after ъ, ь; e elsewhere.
When written as ё in Russian, transliterate as yë or ë.

RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English	Russian	English	Russian	English
sin	sin	sh	sinh	arc sh	$\sinh^{-1}$
cos	cos	ch	cosh	arc ch	$\cosh^{-1}$
tg	tan	th	tanh	arc th	$\tanh^{-1}$
ctg	cot	cth	coth	arc cth	$\coth^{-1}$
sec	sec	sch	sech	arc sch	sech^{-1}
cosec	csc	csch	csch	arc csch	csch^{-1}

Russian	English
rot	curl
lg	log

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HIGH-VOLTAGE PULSE GENERATOR

The invention belongs to high-voltage pulse technology.

Certain high-voltage pulse generators contain a transformer line connected to a load. These generators, however, have low power, a limited transformation coefficient due to the presence of leakage fluxes, and a large number of commutators.

The purpose of the invention is to create a high-voltage pulse generator.

This is accomplished by having a transformer line in the form of a toroidal spiral inside a toroidal primary circuit with a coaxial feeder line.

In the drawing is a diagram of the proposed generator.

It contains: a grounded toroidal primary circuit 1 with a coaxial feeder line 2, inside which is the toroidal spiral of the secondary winding 3. One end of the secondary winding is connected to the primary circuit, and the other end is connected – via a commutator 4 – to a load 5 at point A. The last turn of the secondary winding forms the toroidal inductance L_T.

The high-voltage pulse generator operates in the following way. Initially there is no voltage at the generator. On the coaxial line 2 to the primary winding 1 passes a wave of charging voltage with amplitude U, whose leading edge is significantly shorter than the travel time of the wave over the length of one turn. The difference in

potentials between the high-voltage end of the secondary winding 3 and the primary circuit (at its point B, for example) increases with the passage of the wave along the turns of the winding. The voltage in the generator reaches a maximum value when the wave of charging voltage arrives at the high-voltage end A of the winding 3. Here the voltage $U_{AB} = nU$, where n is the transformer's number of turns.

If the toroidal inductance L is small, the wave is reflected as from a short-circuited end, and the line is recharged to voltage U = 0. When the indicated inductance is great, the wave is reflected from it as from an open end. With reverse movement of the wave the toroidal line is charged up to voltage 2U. The maximum voltage in the generator at the moment a wave arrives at the coaxial input is 2nU. As a result of the process described, the turn-to-turn capacitances C_B are connected in series, each relative to the primary circuit, forming the capacitance $\frac{C_B}{n}$, which is charged up to the maximum voltage.

A load 5 with a high resistance is connected directly to the secondary winding; a load whose resistance is comparable to the wave resistance of series-connected turns must be connected through a switch (commutator) 4.

In the latter case it is advisable to connect the load at the moment of maximum difference in potential between points A and B. The form of the pulses of voltage in the load depends on the parameters of the generator and the load. The commutator can be a self-discharging gap or an element with characteristics of a field emitter of electrons.

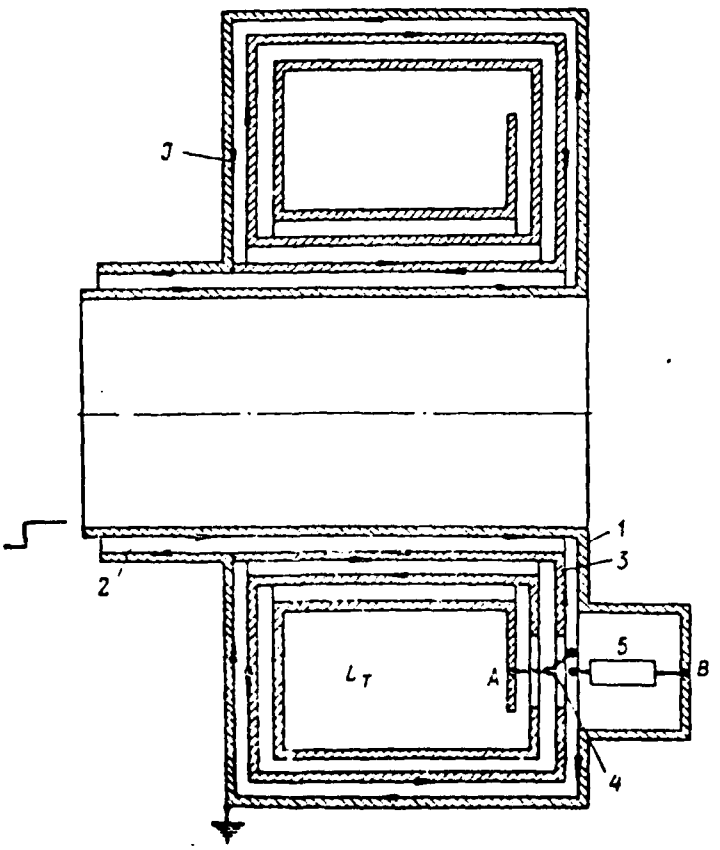
There are no leakage fluxes in this design, since the lines of force of the magnetic field are closed in the gaps between turns; because of this the transformation coefficient can increase. In order to reduce losses due to the skin effect, the thickness of the plates should be compatible with the working frequency. To reduce toroidal inductance, a toroidal ferromagnetic core can be placed inside the generator.

The generator can be used to produce high-power nanosecond pulses.

Object of Invention

1. A generator of high-voltage pulses, containing a toroidal primary circuit, a transformer line connected to a load, and a commutator, characterized by the fact that, in order to increase the transformation coefficient and reduce generator size, the transformer line is a toroidal spiral, which is located inside a toroidal primary circuit with a coaxial feed and is connected at one end with the primary circuit.

2. A generator described in p. 1, characterized by the fact that the transformer line is in the form of two toroidal spirals, one of which is connected with the toroidal primary circuit, with the spirals separated by a dielectric and located inside the primary circuit.



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